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Down,
Beckenham, Kent.

July 25 1873

My dear Dr Sanderson

I shd like to tell you a little about my recent work with Drosera, & to shew that I have profited by yr suggestions, & to ask a question or two.

(1) It is really beautiful how quickly & well Drosera & Dionæa dissolve little cubes of albumen & gelatine. I kept the same sized cubes on wet moss for comparison. When you were here I forgot that I had tried gelatine, but albumen is far better for watching its dissolution & absorption.

Frankland has told me how to test in a rough way for pepsine; & in the autumn he will discover what acid the digestive juice contains.

(2) A decoction of cabbage leaves & green peas causes as much inflection as an infusion of raw meat: a decoction of grass is less powerful. Though I hear that the chemists try to precipitate all albumen from the ext. of Belladonna, I think they must fail, as the ext. causes inflection, whereas a new lot of Atropine, as well as the Valerianate, produce no effect.

(3) I have been trying a good many experiments with heated water. I got a new chemical therm. & placed the long

bulb obliquely, not touching the bottom of the vessel with 37.
A temp. of from 100° to 125° Fahr. causes strong inflections within 10 minutes. A temp. of from 80° to 100° causes some inflection, but after a much longer time.
At 130° there is never any inflection, but the leaf is <u>not</u> killed as is proved by subsequent inflection when placed in a Sol. of Carb. of Ammonia; & by re-expansion when afterwards placed in pure water. The vitality of the leaves is also shewn by the aggregation of the protoplasm when the leaves are given Carb. of Amm. All this holds good until the leaves are heated up to or above 145°. Between 145° & 151° there is a remarkable change; the glands

the 23 minutes must be kept out.

become as white as porcelain, & there is no inflection, nor aggregation of protoplasm when they are immersed in Carb. of Amm.. Should you not call the following case one of heat rigor? Two leaves were heated to 130°; & had every tentacle closely inflected; one was taken out & placed in cold water, & it re-expanded; the other was heated to 145°, & had not the least power of re-expansion. Is not this latter case heat rigor? If you can inform me, I shd very much like to hear, at what temp. cold-blooded & invertebrate animals are killed.

(4.) I must tell you my final result, of which I am sure, of the sensitiveness of Drosera. I made a solution of one pt of Phosphate of Amm. by weight to 218,750 of water: of this sol.

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I gave so much that a leaf got $\frac{1}{8000}^{th}$ of a grain of the phosphate. I then counted the glands & each c.d have got only $\frac{1}{1,552,000}$ of a grain; this being absorbed by the glands sufficed to cause the tentacles having the glands to bend thro' an angle of 180°. Such sensitiveness requires hot weather & carefully selected young, not mature leaves. It strikes me as a wonderful fact.

Down, Beckenham, Kent.

I must add that I took every precaution, by trying numerous leaves at the same time in the sol. & in the same water which was used for making the sol.

(5) If you can persuade yr friend to try the effects of C. of Amm. on the aggregation of the white blood corpuscles, I shd very much like to hear the result.

I hope this letter will not have wearied you. Believe me yours very sincerely

Charles Darwin